

Preface

Agrodiversity, agrobiodiversity and the papers in this special issue of *Acta Botanica Yunnanica*

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The work reported in this special issue of *Acta Botanica Yunnanica* began in the 1980s and took off in 1990, following a meeting between Guo Huijun and others at the Kunming Institute of Botany and Dr Nick Menzies of the Ford Foundation Beijing office. Mainly with Ford Foundation support, the Traditional Land Management Systems Research Programme was set up, expanding its activities after 1992 under the title of the Yunnan Agroforestry Systems Research Project and Indigenous Land Resources Management Programme (YAF). By 1994, YAF had published 16 Working Papers. It was this work, carried out all over Yunnan, although focusing ultimately into a small number of main sites, that identified four main types of agroforestry in Yunnan, with 82 forms and 220 associations (Guo and Padoch, 1995). It also revealed the great dynamism of the systems, in response both to changing economic conditions and to the major innovations in national land tenure policy of the period since 1950.

The United Nations University project on People, Land Management and Environmental Change (PLEC) and YAF were brought into contact late in 1992 by Dr Christine Padoch, who ran a course for the Ford Foundation in Kunming. From 1993 onward, there was a small group of PLEC researchers in Yunnan, at the Kunming Institute of Botany and in other institutes. Early work was mainly in Xishuangbanna. The same group of researchers successfully sought the interest of the MacArthur Foundation for a project in Baoshan Prefecture, on the management of farm and forest land in the buffer zone of the Gaoligongshan Mountain National Nature Reserve. After 1997, when PLEC gained substantial funding from the Global Environmental Facility, the Xishuangbanna and Gaoligongshan work were brought together as the programme of the China Cluster of UNU – PLEC. Much of the work reported here has been done within this enlarged project.

PLEC is concerned with ‘agrodiversity’, ‘the dynamic variation in cropping systems, output and management practice that occurs within and between agroecosystems. It arises from bio – physical differences, and from the many and changing ways in which farmers manage diverse genetic resources and natural variability, and organize their management in dynamic social and economic contexts’ (Brookfield, 2001 forthcoming). Agrodiversity contains four main elements, the two dependent elements of agrobiodiversity (also called agricultural biodiversity), and agro – technical management diversity, and the two more explanatory elements of natural bio – physical diversity and diversity in the social and economic organization of farm production. PLEC has developed this classification so as to assist description and analysis by its members (Brookfield and Stocking, 1999; Brookfield *et al*, 1999). The Chinese contribution has been particularly strong in the study of agricultural biodiversity, work that is reflected in more than half of the papers in this special issue. Its ‘household – based agrobiodiversity assessment’, described in a following paper by Guo, Padoch and Fu, develops important links to the analysis of diversity in social and economic organization. It is therefore useful to expand somewhat on the topic of agricultural biodiversity as a field of study, because the collective contribution of the papers in this issue is principally to that field.

During the years in which PLEC was first being developed and then has operated, interest in agricultural

biodiversity has surged. Two important new books appeared in 1999 alone (Wood and Lenné, 1999; Brush, 1999). Two international programmes, one managed by the CGIAR International Plant Genetic Resources Institute (IPGRI) and the other by a consortium of Non – Government Organizations, have been under way for some years. There is special emphasis on within – species diversity, particularly in regions such as China which are centres of diversity for major crop plants. Chinese involvement in this important new sub – field is reflected in the final group of papers in this special issue.

As commonly defined, agricultural biodiversity includes all crops and livestock and their wild relatives, and all interacting species of pollinators, symbionts, pests, parasites, predators and competitors (Wood and Lenné, 1999). It is concerned with the whole biotic content of the agroecosystem, and in most definitions excludes wild plants and animals of food or non – food value outside the agroecosystem unless they are wild relatives of useful plants. There is some uncertainty as to how far biodiversity within the agroecosystem that has no specific actual or potential impact on agricultural production is also within the domain of agricultural biodiversity. The papers in this issue reflect this uncertainty, in that they do include discussion of wild plants and also plants of commercial use outside the agroecosystem.

In fact, neither the scope of agricultural biodiversity nor that of the agroecosystem can readily be bounded. The flora and fauna of uncultivated patches within and around the agroecosystem may perform important indirect services to agriculture and some of these services may even be abiotic in function, as in the case of soil and water conservation. Historically, and still actively in many managed systems, wild biota were and are of major importance both to human livelihood and ecosystem maintenance (Brookfield, 2001, forthcoming).

World – wide, most work done until now in the field of agricultural biodiversity has concerned crop plants, and there has been a strong focus on the within – species diversity of these plants and their wild relatives. There is a close relationship with the burgeoning concern to conserve this diversity, widely perceived for more than 60 years as being rapidly eroded through the substitution of a smaller number of scientifically – bred cultivars. From the 1970s, this led to major efforts to collect and conserve germplasm material *ex situ*, mainly in gene – banks. Since the 1980s it has increasingly been realised that a very large amount of crop – plant diversity is still being managed by small farmers, especially in regions where conditions are not well suited to modern, mechanized, high – input production. Conservation of diversity *in situ*, on farms, has become a highly important goal. In this work, management is interpreted mainly as farmers' selection and acquisition of the germplasm that they plant in their fields and house – gardens. This aspect of management has attracted a lot of research interest during the 1990s, leading to some important findings, especially in areas of high varietal diversity of such crops as potatoes, maize and rice (e. g. Brush, 1992; 1995, Zimmerer, 1996, Bellon, 1996; Louette, 1999). But 'management' means a good deal more than this.

Papers in this special issue take account of certain other aspects of management diversity that are important. In particular, the spatial arrangement of crops and trees in agroforestry associations has been an important object of study by the PLEC group in China. Writing of central American small farmers some years ago, Wilken (1987) analyzed their practices successively under the headings of the management of soil fertility and surface, of slopes, of water on and within the ground, of crop microclimate, and of horizontal and vertical space. All these are aspects of agro – technical management within agrodiversity, creating the conditions within which a diversity of crops is grown. The new agricultural biodiversity, by definition, includes management of soil biota and hence should include management of the soil itself. This question is taken up in the Wood and Lenné collection, where one paper deals in some depth with the complex and even contradictory findings from some 20 years experience of decline in the use of deep tillage in American and European farming (Edwards *et al*, 1999). Management of the soil is discussed in Stocking's paper in this issue, and it is a topic of rising

importance.

Agricultural biodiversity is a subset of agrodiversity. It brings together the hitherto separate fields of agriculture and biodiversity. It has to do so in a context which embraces agroecosystem management by farms and farming communities, which in turn involve both the bio – physical system which is being managed, and the social and political context of management. Although the two latter aspects of agrodiversity are not developed in this special issue, they are an important part of the total field which is here explored in part. The China Cluster of PLEC has been very active in getting its work into print, and this issue presents a major and important part of its work to a wider scientific readership. The issue is also an important contribution to the field of biodiversity conservation.

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